

Prime Hook

National Wildlife Refuge

A Changing Wetland Ecosystem

Background

Administered by the U.S. Fish and Wildlife Service (Service), Prime Hook National Wildlife Refuge (NWR) was established in 1963 to preserve and protect habitats for migratory birds. Situated along the marshes of the western Delaware Bay, the refuge hosts thousands of ducks, geese and shorebirds each year and provides habitat for other species like the bald eagle and the endangered Delmarva fox squirrel.

Tidal Salt Marsh and Impounded Wetlands:

Roughly 80 percent of the refuge is a mix of fresh and saltwater wetlands stretching from Slaughter Beach in the north to the Broadkill River in the south. The northern and southernmost marshes, Units I and IV respectively, have always been tidal salt marshes (see map below).



Map of Prime Hook National Wildlife Refuge



2006: Observation platform located behind dune in Unit I.



2010: The platform now sits in the Delaware Bay due to shoreline erosion.

Salt marshes are highly productive habitats and support a rich diversity of fish and wildlife. They are also one of the most vulnerable habitats in the world. The refuge has almost 2,300 acres of tidal salt marsh, but they are a rapidly diminishing habitat type along the East Coast. Tidal salt marsh communities are particularly important nursing grounds for fin- and shellfish.

In the 1980s, the Service created two freshwater impoundments totaling 4,000 acres (Units II and III) to improve habitat conditions for wintering waterfowl. Through a series of dikes and water control structures, refuge staff lowered water levels in the spring to allow the growth of annual marsh plants like wild rice, millet and beggars tick. This provided a place for migrating shorebirds to feed in the spring and nesting areas for wading birds like black-necked stilts in the summer. Higher water levels in the fall and winter made the seeds of annual plants available for thousands of migratory ducks and geese. Unit II,

located south of Fowler Beach Road and north of Prime Hook Road, was created directly behind a natural dune system.

Sea Level Rise:

Prime Hook NWR is in transition. Sea levels in Delaware have risen 13 inches in the last 100 years. Experts predict global sea levels will rise anywhere from one to three meters over the next century. Moreover, increasing frequency and intensity of storm events is causing additional flooding and erosion. Over the past 85 years, about 500 feet of beach front at Prime Hook have been lost.

Data collected at the Lewes tide gauge illustrates the number of times water levels exceed “mean higher high water” (MHHW), which represents an unusually high tide. In the late 1980s, there were typically 10-20 instances per year of consecutive tides above MHHW, but in 2009, there were over 30 such events. Coastal flood warnings issued by the National Weather Service



Unit I salt marsh, October 2010. The 2006 breach has allowed for tidal exchange, resulting in salt marsh accretion in Unit I. The saltmarsh in Unit I is more resilient, and has buffered the uplands against the impacts of coastal storms and breaches.

Unit II dune breach, October 2010. The artificial freshwater impoundments were not resilient against sea level rise, erosion, and storm surge. Unlike the resilient salt marshes in Unit I, Unit II is transitioning to open water, and has not buffered the uplands well. Hence, wetlands and uplands are being lost in Unit II.

have also increased and coincide with consecutive tidal events above MHHW.

Refuge staff is currently working with our partners to monitor the potential effects of sea level rise and other environmental changes on refuge wildlife and habitat.

Unit I Overwash:

In 2006, Hurricane Ernesto opened a breach in the dunes between Unit I and Delaware Bay. The Service did not repair the breach in order to maintain a healthy, natural salt marsh. Salt marsh is an important habitat between uplands and open water, and absorbs storm energy during severe weather events. In Unit I, tidal exchange now allows sediment to enter the marsh, which contributes to marsh accretion. This natural process allows salt marsh to naturally increase its elevation and defend against rising sea levels. In the long run, accretion will enable the marsh to more effectively keep up with sea level rise than manmade defenses. The Service's 2008 decision to allow the northernmost overwash to proceed naturally has rejuvenated the salt marsh in Unit I and has been beneficial for marsh birds and other wildlife. That decision complies with the Service's policies and regulations and is also consistent with how the State of Delaware manages their lands.

Unit II Overwash:

Repeated Nor'easter storm events in 2009/2010 overwashed the duneline along Unit II, impacting the artificially managed freshwater impoundments south of Fowler Beach Road. The Service proposed to fill the breaches and restore the duneline, as a short-term measure to slow erosion and to allow careful analysis of management options. The Service completed an Environmental Assessment (EA), as required by the National

Environmental Policy Act. Due to litigation and a lengthy process to complete the EA, the dune rebuilding finally occurred in September, 2011. The rebuilt dunes were destroyed within a week, illustrating the short-term nature of this solution. At this time, there is not enough sand on-site to rebuild the dunes again.

Restoration Science:

The Service has worked with partners and academia to collect the best available science underlying the transition at Prime Hook NWR. The science indicates that rebuilding the dune line alone is not enough. Rather, a careful and detailed marsh restoration plan, which rebuilds a resilient mix of salt, brackish, and some freshwater marsh, is a sustainable option to help Prime Hook adapt to the realities of sea-level rise and climate change.

A restored marsh ecosystem would provide invaluable ecosystem services to the surrounding communities-mitigating flooding, storm surge, and erosion that have resulted from the open water. A recent national report suggests that Prime Hook NWR's 5,000 acre wetland system, once restored, would provide approximately \$53 million worth of ecosystem services.

Roads:

A variety of factors are impacting the flooding regime of the area, which is directly impacting the community's ability to use roads that run through the refuge. These factors include subsidence of local and regional landforms, subsidence of roads, sea level rise, more severe and frequent storm effects, and prolonged frequency and duration of flooding. The refuge is working with the Delaware Department of Transportation to determine ways to improve wetland hydrology and mitigate flooding.

Planning for the Future:

The Service is in the process of developing the refuge's comprehensive conservation plan (CCP). The CCP will outline the multiple, large-scale and long-term factors that contribute to habitat management decisions over the next 15 years, and will analyze alternative management scenarios given these factors. The CCP will address impoundment and shoreline management in further detail, and will contain long-term strategies to manage habitat for wildlife consistent with national policies while considering the impacts of that management to the surrounding community. The draft CCP will be released for public comment in spring, 2012, with a final CCP expected to be in place by the end of 2012.

At the same time that the CCP and environmental compliance is being completed, the refuge has convened a restoration team made up of Federal and state agencies, academia, and non-profit partners. The team will develop a scope of work for saltmarsh restoration, which will be included as one of the alternatives in the draft CCP.

For more information, please visit www.fws.gov/northeast/primehook

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